

Applicant: ISHIZAKA *et al.*  
Serial No: 10/650,087  
Filing Date: August 28, 2003  
Page: 2 of 14

### Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in this application.

Claim 1 (Currently Amended): A substrate treatment device comprising:

a treatment chamber in which a substrate is to be placed;

a supply system configured to supply at least two kinds of treatment gases to said treatment chamber, one of said at least two kinds of treatment gases being liquid under atmospheric pressure;

an exhaust system having a turbo molecular pump and a dry pump, configured to exhaust the treatment gases from said treatment chamber;

a capturing unit, interposed between said ~~treatment chamber~~ turbo molecular pump and said dry pump and containing fine grains, the capturing unit ~~configured to capture~~ absorbing by the fine grains at least one kind of the treatment gas exhausted from said treatment chamber; and

a trap with a cooled plate member therein provided between said turbo molecular pump and said dry pump ~~on an upstream side of said capturing unit~~, the trap configured to ~~physically absorb~~ absorb powder by said cooled plate member.

Claim 2 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 1, wherein the fine grains contained in said capturing unit are zeolite.

Claim 3 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 1, wherein said capturing unit captures the treatment gas that is liquid or solid at room temperature and at atmospheric pressure.

Claim 4 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 1, wherein the treatment gas captured by said capturing unit is at least one of TiF<sub>4</sub>, TiCl<sub>4</sub>, TiBr<sub>4</sub>, TiI<sub>4</sub>, Ti[N(C<sub>2</sub>H<sub>5</sub>CH<sub>3</sub>)<sub>2</sub>]<sub>4</sub>, Ti[N(CH<sub>3</sub>)<sub>2</sub>]<sub>4</sub>, Ti[N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>]<sub>4</sub>, TaF<sub>5</sub>, TaCl<sub>5</sub>, TaBr<sub>5</sub>, TaI<sub>5</sub>, Ta(NC(CH<sub>3</sub>)<sub>3</sub>)(N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>)<sub>3</sub>, Ta(OC<sub>2</sub>H<sub>5</sub>)<sub>5</sub>, Al(CH<sub>3</sub>)<sub>3</sub>, Zr(O-t(C<sub>4</sub>H<sub>9</sub>))<sub>4</sub>, ZrCl<sub>4</sub>, SiH<sub>4</sub>, Si<sub>2</sub>H<sub>6</sub>,

Applicant: ISHIZAKA *et al.*  
Serial No: 10/650,087  
Filing Date: August 28, 2003  
Page: 3 of 14

$\text{SiH}_2\text{Cl}_2$ , and  $\text{SiCl}_4$ .

Claim 5 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 1, further comprising: a supply controller configured to control said supply system to supply the treatment gases alternately.

Claim 6 (Currently Amended): A substrate treatment device comprising:

a treatment chamber in which a substrate is to be placed;

a supply system configured to supply at least two kinds of treatment gases to said treatment chamber, one of said at least two kinds of treatment gases being liquid under atmospheric pressure;

an exhaust system having a turbo molecular pump and a dry pump, configured to exhaust the treatment gases from said treatment chamber;

a capturing unit, interposed between said ~~treatment chamber~~ turbo molecular pump and said dry pump, the capturing unit ~~configured to capture~~ absorbing by a chemical action at least one kind of the treatment gas exhausted from said treatment chamber; and

a trap with a cooled plate member therein provided between said turbo molecular pump and said dry pump on an upstream side of said capturing unit, the trap ~~configured to physically absorb~~ absorbing powder by said cooled plate member.

Claim 7 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 6, wherein said capturing unit has a metal oxide to capture the treatment gas.

Claim 8 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 7, wherein the metal oxide is  $\text{Al}_2\text{O}_3$ .

Claim 9 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 6, further comprising:

a supply controller configured to control said supply system to alternately supply the treatment gases.

Applicant: ISHIZAKA *et al.*  
Serial No: 10/650,087  
Filing Date: August 28, 2003  
Page: 4 of 14

Claim 10 (Currently Amended): A substrate treatment device comprising:

a treatment chamber in which a substrate is to be placed;

a supply system configured to supply at least two kinds of treatment gases to said treatment chamber, one of said at least two kinds of treatment gases being liquid under atmospheric pressure;

an exhaust system having a turbo molecular pump and a dry at least one pump, configured to exhaust the treatment gases from said treatment chamber;

an inert gas supply system configured to supply an inert gas into said exhaust system that is on a downstream side of the dry pump on a final stage;

a capturing unit, interposed between said turbo molecular pump treatment chamber and said dry pump, the capturing unit absorbing ~~configured to capture~~ by a chemical action at least one kind of the treatment gas exhausted from said treatment chamber; and

a trap with a cooled plate member therein provided between said turbo molecular pump and said dry pump on an upstream side of said capturing unit, the trap ~~configured to physically absorb~~ absorbing powder by said cooled plate member.

Claim 11 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 10, wherein the inert gas includes at least one of Ar, He, and N<sub>2</sub>.

Claim 12 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 10, wherein the treatment gases include at least one of TiF<sub>4</sub>, TiCl<sub>4</sub>, TiBr<sub>4</sub>, TiI<sub>4</sub>, Ti[N(C<sub>2</sub>H<sub>5</sub>CH<sub>3</sub>)<sub>2</sub>]<sub>4</sub>, Ti[N(CH<sub>3</sub>)<sub>2</sub>]<sub>4</sub>, Ti[N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>]<sub>4</sub>, TaF<sub>5</sub>, TaCl<sub>5</sub>, TaBr<sub>5</sub>, TaI<sub>5</sub>, Ta[NC(CH<sub>3</sub>)<sub>3</sub>](N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>)<sub>3</sub>, Ta(OC<sub>2</sub>H<sub>5</sub>)<sub>5</sub>, Al(CH<sub>3</sub>)<sub>3</sub>, Zr(O-t(C<sub>4</sub>H<sub>9</sub>))<sub>4</sub>, ZrCl<sub>4</sub>, SiH<sub>4</sub>, Si<sub>2</sub>H<sub>6</sub>, SiH<sub>2</sub>Cl<sub>2</sub>, and SiCl<sub>4</sub>.

Claim 13 (Currently Amended): The ~~[[A]]~~ substrate treatment device as set forth in claim 10, further comprising:

a supply controller configured to control said supply system to alternately supply the treatment gases.

Applicant: ISHIZAKA *et al.*  
Serial No: 10/650,087  
Filing Date: August 28, 2003  
Page: 5 of 14

Claim 14 (Currently Amended): A substrate treatment device comprising:

a treatment chamber in which a substrate is to be placed;

a supply system configured to supply at least two kinds of treatment gases into said treatment chamber, one of said at least two kinds of treatment gases being liquid under atmospheric pressure;

an exhaust system having a turbo molecular pump and a dry at least one pump, configured to exhaust the treatment gases from said treatment chamber;

a heater configured to heat said exhaust system that is on a downstream side of the dry pump on a final stage;

a capturing unit interposed between said turbo molecular pump treatment chamber and said dry pump, the capturing unit absorbing configured to capture by a chemical action at least one kind of the treatment gas exhausted from said treatment chamber; and

a trap with a cooled plate member therein provided between said turbo molecular pump and said dry pump on an upstream side of said capturing unit, the trap configured to physically absorbing absorb powder by said cooled plate member.

Claim 15 (Currently Amended): The [[A]] substrate treatment device as set forth in claim 14, wherein the treatment gases include at least one of  $\text{TiF}_4$ ,  $\text{TiCl}_4$ ,  $\text{TiBr}_4$ ,  $\text{TiI}_4$ ,  $\text{Ti}[\text{N}(\text{C}_2\text{H}_5\text{CH}_3)_2]_4$ ,  $\text{Ti}[\text{N}(\text{CH}_3)_2]_4$ ,  $\text{Ti}[\text{N}(\text{C}_2\text{H}_5)_2]_4$ ,  $\text{TaF}_5$ ,  $\text{TaCl}_5$ ,  $\text{TaBr}_5$ ,  $\text{TaI}_5$ ,  $\text{Ta}[\text{N}(\text{C}(\text{CH}_3)_3)(\text{N}(\text{C}_2\text{H}_5)_2)_3]$ ,  $\text{Ta}(\text{OC}_2\text{H}_5)_5$ ,  $\text{Al}(\text{CH}_3)_3$ ,  $\text{Zr}(\text{O}-t(\text{C}_4\text{H}_9))_4$ ,  $\text{ZrCl}_4$ ,  $\text{SiH}_4$ ,  $\text{Si}_2\text{H}_6$ ,  $\text{SiH}_2\text{Cl}_2$ , and  $\text{SiCl}_4$ .

Claim 16 (Currently Amended): The [[A]] substrate treatment device as set forth in claim 14, further comprising:

a supply controller configured to control said supply system to supply said treatment gases alternately.

Claim 17 (Withdrawn): A substrate treatment method comprising:

a metal-containing gas supply step of supplying a metal-containing gas at a first flow

Applicant: ISHIZAKA *et al.*  
Serial No: 10/650,087  
Filing Date: August 28, 2003  
Page: 6 of 14

rate into a treatment chamber while the treatment chamber has a substrate placed therein;

a metal-containing gas exhaust step of exhausting the metal-containing gas from the treatment chamber via an exhaust system;

a nitriding agent gas supply step of supplying a nitriding agent gas into the treatment chamber at a second flow rate that is 10 times as large as the first flow rate or at a larger rate; and

a nitriding agent exhaust step of exhausting the nitriding agent gas from the treatment chamber via the exhaust system.

Claim 18 (Withdrawn-Currently Amended): The [[A]] substrate treatment method as set forth in claim 17, wherein the nitriding agent gas is supplied at a flow rate of 300 sccm to 1000 sccm.

Claim 19 (Withdrawn-Currently Amended): The [[A]] substrate treatment method as set forth in claim 17, wherein the metal-containing gas includes at least one of TiF<sub>4</sub>, TiCl<sub>4</sub>, TiBr<sub>4</sub>, TiI<sub>4</sub>, Ti[N(C<sub>2</sub>H<sub>5</sub>CH<sub>3</sub>)<sub>2</sub>]<sub>4</sub>, Ti[N(CH<sub>3</sub>)<sub>2</sub>]<sub>4</sub>, Ti[N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>]<sub>4</sub>, TaF<sub>5</sub>, TaCl<sub>5</sub>, TaBr<sub>5</sub>, TaI<sub>5</sub>, and Ta(NC(CH<sub>3</sub>)<sub>3</sub>)(N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>)<sub>3</sub>.

Claim 20 (Withdrawn-Currently Amended): The [[A]] substrate treatment method as set forth in claim 17, wherein the nitriding agent gas includes NH<sub>3</sub>.

Claim 21 (Withdrawn): A cleaning method for a substrate treatment device, comprising:

a substrate treatment device preparing step of preparing a substrate treatment device that treats a substrate by supplying a metal-containing gas and a nitriding agent gas to the substrate; and

a nitriding agent gas supply step of supplying a nitriding agent gas into an exhaust system of the substrate treatment device while the substrate treatment device does not have the substrate placed therein.

Claim 22 (Withdrawn-Currently Amended): The [[A]] cleaning method for a substrate

Applicant: ISHIZAKA *et al.*  
Serial No: 10/650,087  
Filing Date: August 28, 2003  
Page: 7 of 14

treatment device as set forth in claim 21, wherein the nitriding agent gas supplied in said nitriding agent gas supply step is supplied at a flow rate larger than a flow rate of the nitriding agent gas supplied for the treatment.

Claim 23 (Withdrawn-Currently Amended): The [[A]] cleaning method for a substrate treatment device as set forth in claim 21, wherein the nitriding agent gas supplied in said nitriding agent gas supply step is supplied at a flow rate of 300 sccm to 1000 sccm.

Claim 24 (Withdrawn-Currently Amended): The [[A]] cleaning method for a substrate treatment device as set forth in claim 21, wherein the metal-containing gas includes at least one of  $\text{TiF}_4$ ,  $\text{TiCl}_4$ ,  $\text{TiBr}_4$ ,  $\text{TiI}_4$ ,  $\text{Ti}[\text{N}(\text{C}_2\text{H}_5\text{CH}_3)_2]_4$ ,  $\text{Ti}[\text{N}(\text{CH}_3)_2]_4$ ,  $\text{Ti}[\text{N}(\text{C}_2\text{H}_5)_2]_4$ ,  $\text{TaF}_5$ ,  $\text{TaCl}_5$ ,  $\text{TaBr}_5$ ,  $\text{TaI}_5$ , and  $\text{Ta}(\text{NC}(\text{CH}_3)_3)(\text{N}(\text{C}_2\text{H}_5)_2)_3$ .

Claim 25 (Withdrawn-Currently Amended): The [[A]] cleaning method for a substrate treatment device as set forth in claim 21, wherein the nitriding agent gas includes  $\text{NH}_3$ .

Claim 26 (Withdrawn): A cleaning method for a substrate treatment device, comprising  
a nitriding agent gas supply step of supplying a nitriding agent gas into an exhaust system of the substrate treatment device that treats a substrate by supplying a metal-containing gas and a nitriding agent gas, while the substrate treatment device does not have the substrate placed therein.